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NOTES UPON CORDYLOPHORA LACUSTRIS

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VARIABILITY among living things, whether in habits, structure, or development, is now so fully recognized as to need no special emphasis as an important law of nature. The list of facts is not, however, so complete as to render others unimportant; and it is with this point in view that the following notes have been thought worthy of record.

Cordylophora as a genus of hydroids has long been of more than usual interest to the biologist as affording among its phylum a rather striking illustration of remarkable range of environmental adaptation. Its ability to range from a distinctively marine habitat to that of fresh water has long been known, and is well expressed in the specific name applied to it. Allman was, I think, the first to call particular attention to this peculiarity and to make some experiments and repeated observations of very interesting nature in connection with it.¹ It is with a view to confirming and extending these observations that attention is directed to them in this connection.

Through the kindness of Mr. H. W. Britcher, of Johns Hopkins University, I received in December, 1895, a colony of these hydroids obtained from near Baltimore, Md. They had been collected by Mr. Britcher some time earlier and were brought to Syracuse in about a pint of brackish water, attached to a bit of slag upon which they grew, and upon which were also growing several specimens of acorn barnacles, *Balanus*, and bits of a filamentous marine alga. They remained in my laboratory for several weeks, where they were inspected by students and visitors. Twice during this time they were frozen almost solid and, as I supposed, killed by the ordeal. They were therefore set aside and for several weeks unobserved. A subsequent examination, however, showed a few

¹ Allman, *Gymnoblasic Hydroids*, p. 253.

living specimens, though the colony had evidently suffered as a whole. No particular attention was given them, and the later growth of algae had seemed to entirely stifle the animal life of the jar. A portion of the water was poured off and the jar replenished from the laboratory tap, which is supplied from the city water system. Once more the jar was set aside and unnoticed for at least a fortnight, when, to my surprise, one day the barnacles were seen to be living and active. This observation led to the introduction of specimens of Protozoa and Ostracoda from another aquarium to serve as possible food supply. No further attention was given to the matter till incidentally late in May, 1896, when from a cursory examination no life was apparent except that of the Ostracoda, which had evidently multiplied to considerable extent. The water was once more poured off and once more renewed from the tap. Observations made some time later revealed the presence of several colonies of hydroids in apparently flourishing condition, and the barnacles were also living and active.

While the observations as a whole are interesting, those aspects pertaining to the barnacles were specially so. While these animals can endure long periods of removal from the water, as removal above tide-water, etc., there is no record, so far as I am aware, that they can endure changes so radical in their nature as those above indicated. That the water was at first saline to considerable extent was evident enough in the fact of their presence in it. That they could endure a change to practically fresh water is likewise evident. It is true that the changes were not sudden ; and this would indicate the no less interesting fact of the adaptability of the organism to changing conditions of environment.

Allman records that in his experiments he found that the hydroids when changed from the slightly brackish water of the Indian docks to that of fresh showed unmistakable signs of decline, many of the hydranths falling from the stem and the colonies as a whole showing decadence. On the additions of slight portions of sea water they soon recovered and grew freely. I have had similar results from the additions of small quantities of salt to the water of the aquarium.

While no chemical analysis was made of the quantitative composition of the water at the beginning and conclusion of the observations, it is, however, evident that it must have been almost completely changed in the several operations through which it passed.

Lankester¹ has recorded the fact that *Cordylophora* may be kept for some time in cans of water if kept in a dark place. My observations show that this precaution is not essential, since they were frequently exposed to direct sunlight and were constantly open to strongly diffused light in a north window. The following extract from a letter of Mr. Britcher will show that his own observations on this point are quite in accord with my own: "From December 15 to January 15 they were kept in the cellar, and when taken out only a few individuals seemed to be living. Since this time they have been on my window, where they get direct sunlight from 2 to 4 P.M. The water has frozen several times, once apparently solid. . . . To-day, March 5, there are at the lowest estimate over a hundred individuals in the colony."

At the present writing, October 20, both hydroids and barnacles are still living in less than a pint of water containing only a trace of salts in solution, the hydroids feeding freely upon the Ostracoda, entangling them in the long and graceful folds of their tentacles and engulfing them entire. They seem also to be reproducing both by budding and from sexual gonophores in perfectly normal fashion. While the barnacles are alive and sweeping their tentacles as usual, the movement is apparently feeble and would indicate a low stage of vitality.²

¹ *Quar. Journ. Mic. Sci.*, vol. xvi, p. 26.

² Since the foregoing "Notes" were in type the vessel in which the organisms described were originally placed has been reëxamined with some care and not a little interest. Although left without attention of any sort during the entire year, except for the precaution of a close cover to prevent access of dust or loss from evaporation, colonies of hydroids are still living and thriving apparently as normal as when first examined. It should be said, however, that those living at present are not the identical colonies, though of course direct offspring of them. No food of any sort has been provided from without, though the examination revealed the presence of several species of Protozoa, Rotifera, Vermes, and also several species of Algae, Diatoms, etc.

The barnacles, on the other hand, have apparently perished. This is, however, not strange. The wonder is that under the extremely artificial conditions any life should have persisted during so long a period with no precautions to prevent deterioration. Such, however, are the facts, open attention to which has been directed at several times within the past few weeks. If a similar experiment has been made I should be glad to have my attention directed to it.

SYRACUSE UNIVERSITY,

October 10, 1897.